SOLAR SENTINELS

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Living With a Star
Measurement Requirements Workshop
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Primary LWS Task:

To carry out scientific observations and research that will result in improved space weather predictions.

SENTINELS Region of Focus:

The Heliosphere: All solar disturbances evolve as they transit the heliosphere.

SENTINELS Space Weather Goals:

1. Global characterization of the heliosphere => Improved accuracy of propagation models.
2. Increase the lead time for Geospace forecasts.
3. Improve forecast accuracy.

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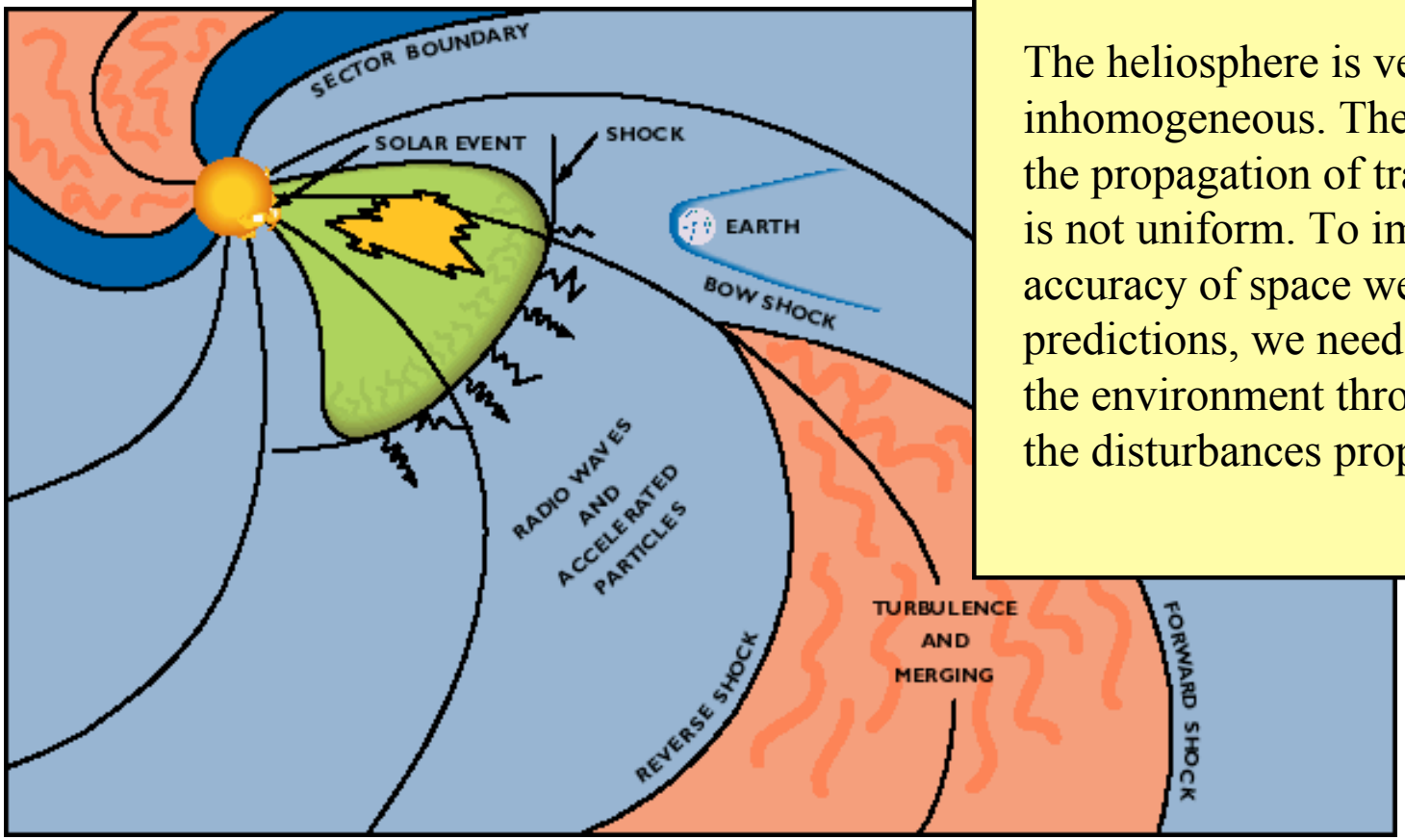
Why do we care about the heliosphere?



The heliosphere is very inhomogeneous. Therefore, the propagation of transients is not uniform. To improve accuracy of space weather predictions, we need to know the environment through which the disturbances propagate.

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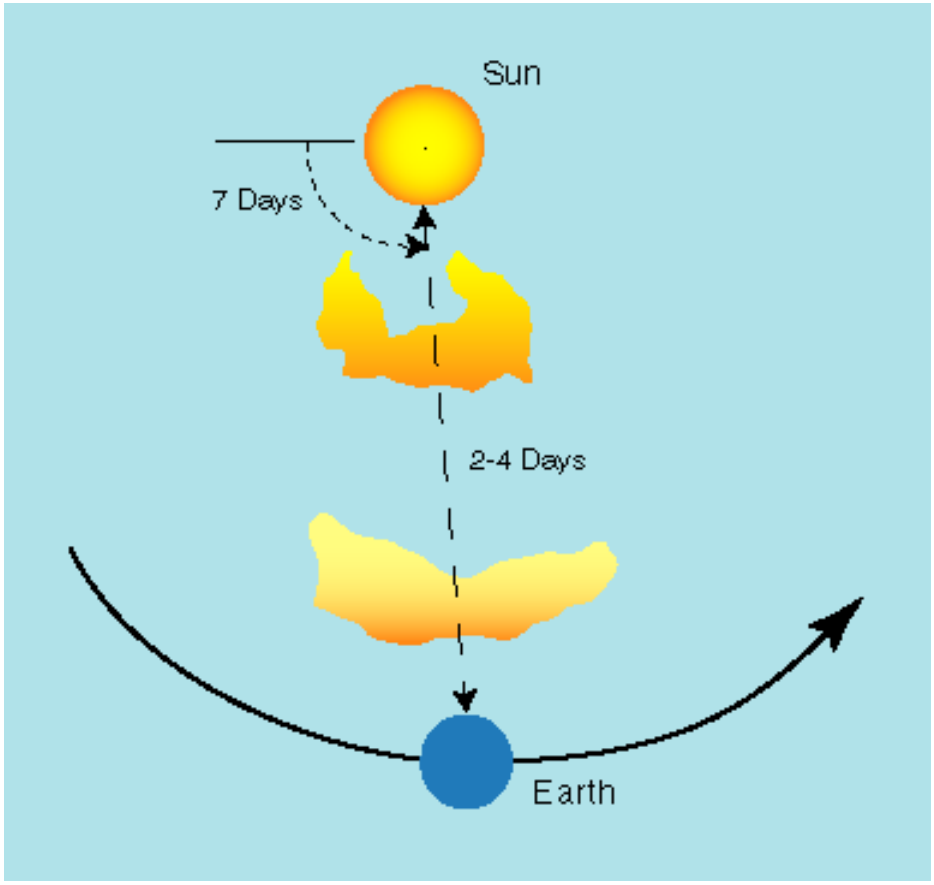
How can we increase forecast lead time for Geospace?

- Disturbances take only 2-4 days to reach Earth
- In 7 days solar active regions rotate from limb to central meridian

In order to increase the lead time for forecasts we must observe the solar Far Side.



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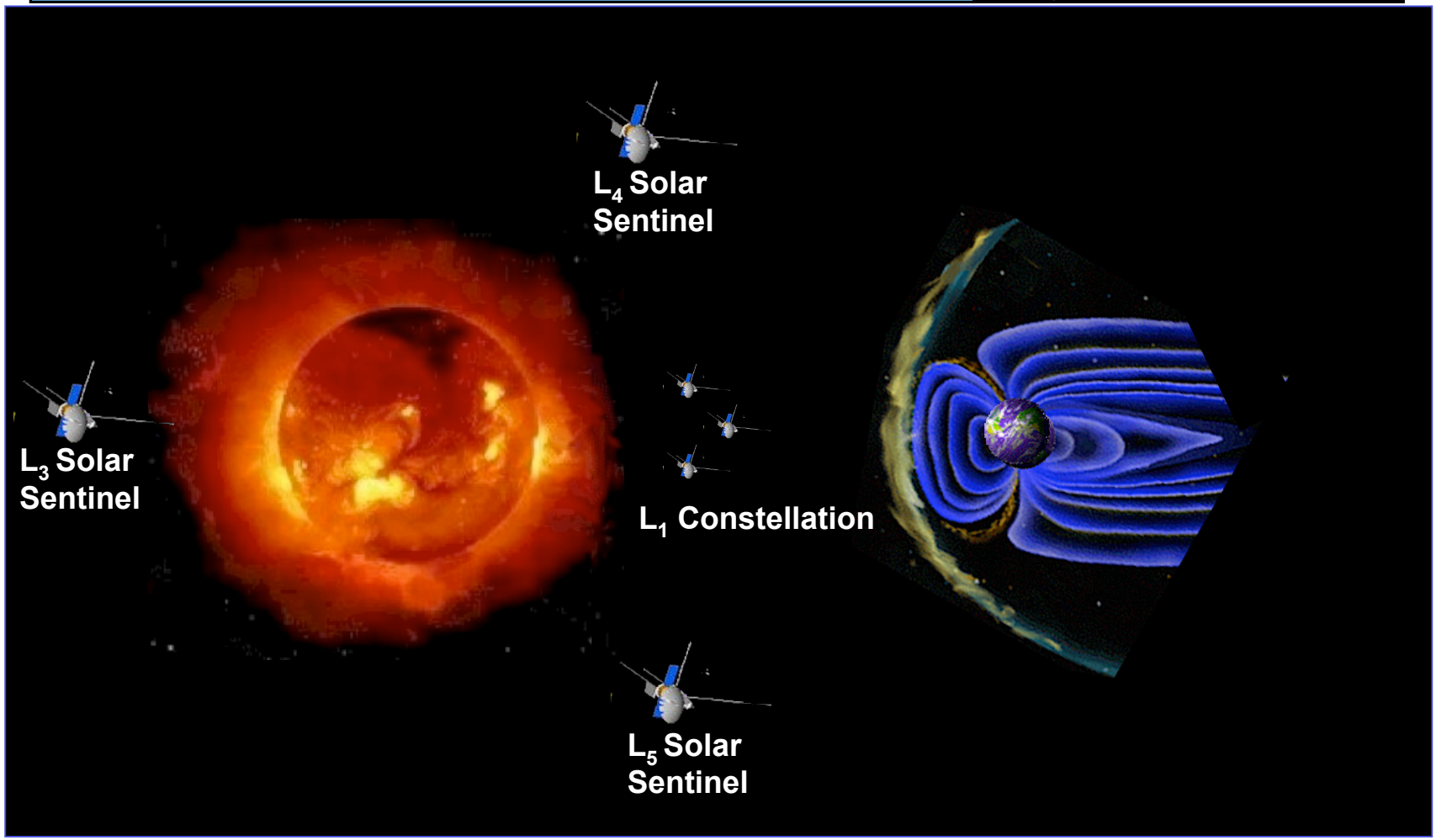

Multi-point observations from unique vantage points are necessary to determine the 3D character of the heliosphere and the propagation of solar events.

Focus Area	Science Question	Space Weather Application	Measurement Requirements	Status	Mission Concepts
Whole Sun Observations	What is the origin and nature of the solar dynamo? How do active regions evolve? What is the mechanism of ejection of mass and energy from the Sun?	Long-term solar activity Predict occurrence and intensity of CMEs and flares	Doppler-Magnetograph of the far side EUV at 2 wavelengths, Radio Occultation of the corona from the far side	New Develop-mental: *SOHO, STEREO, Yohkoh, Trace*	Far Side Observatory
Global Heliosphere	How do large structures evolve during transit to Earth? What is the 3D structure of the heliosphere near the ecliptic?	Increase accuracy of propagation time. How far can we go from Earth before we lose the accuracy of prediction? Increase accuracy of propagation time.	Vector magnetic field, Solar wind plasma, Heliospheric Imager, Solar wind composition, High energy particles, Plasma waves from widely separated vantage points	Develop-mental: *STEREO, PVO, Helios*	Far Side Observatory Next Generation STEREO L1 Constellation
Solar Wind Input to Geospace	How important are solar wind gradients and radial evolution to forecasting geomagnetic activity?	Increase accuracy of forecasts. Monitor solar wind energy input.	Vector magnetic field, Solar wind plasma, and Energetic particles	Mature: *Triana, ACE, WIND, ISEE 3*	L1 Constellation

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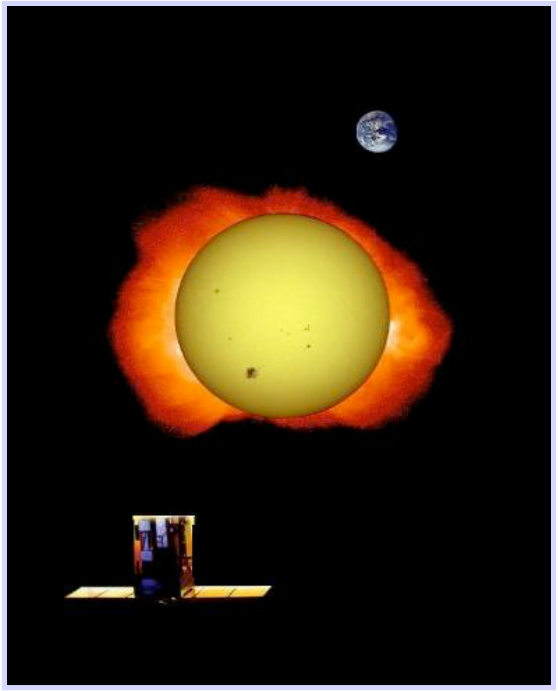
Far Side Observatory:

3-axis stabilized s/c permanently stationed at about 170 degrees from the Sun-Earth line.

Instruments:

EUV / Irradiance
Doppler-Magnetograph
Magnetometer
Solar Wind Analyzer
Energetic Particle Detectors



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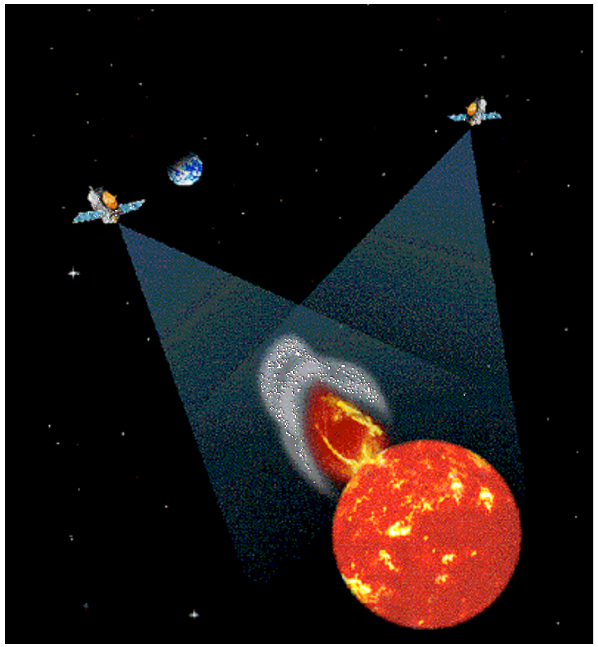
Next Generation STEREO

3-axis stabilized s/c one leading the other lagging Earth in a 1 AU orbit up to 60 degrees.

Instrumentation:

Coronagraph
Heliospheric Imager
EUV
Doppler-Magnetograph
Magnetometer
Solar Wind Analyzer
Energetic Particle Detectors
Plasma Wave Analyzer



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L1 Constellation:

3 spin stabilized s/c in L1 halo orbit.

Instruments:

Magnetometer
Solar Wind Analyzer
Energetic Particle Detectors
Plasma Wave Analyzer